

November 9, 2004

Mr. Christopher M. Crane, President  
and Chief Nuclear Officer  
Exelon Nuclear  
Exelon Generation Company, LLC  
200 Exelon Way, KSA 3-E  
Kennett Square, PA 19348

SUBJECT: PEACH BOTTOM ATOMIC POWER STATION, UNITS 2 AND 3 - REQUEST FOR  
ADDITIONAL INFORMATION (RAI) REGARDING AMENDMENT REQUEST FOR  
FIRE PROTECTION CHANGES (TAC NOS. MC0987 AND MC0988)

Dear Mr. Crane:

By letter dated September 26, 2003, Exelon Generation Company, LLC, submitted a request proposing to amend the Operating Licenses for Peach Bottom Atomic Power Station, Unit Nos. 2 and 3. The proposed amendment would allow certain changes to your Fire Protection Program.

In order to continue our review of your request, the Nuclear Regulatory Commission staff requires the additional information described in the enclosure. This information was forwarded to Mr. David Helker of your staff on October 6, 2004, and was discussed with Mr. Helker and other members of your staff on October 28, 2004. We understand that you intend to respond to these questions within 30 days of receipt of this letter.

Sincerely,

**/RA/**

George F. Wunder, Project Manager, Section 2  
Project Directorate I  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket Nos. 50-277 and 50-278

Enclosure: RAI

cc w/encl: See next page

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REQUEST FOR ADDITIONAL INFORMATION (RAI)

PEACH BOTTOM ATOMIC POWER STATION, UNITS 2 AND 3

REGARDING CHANGES TO FIRE PROTECTION PROGRAM

By letter dated September 26, 2003, Exelon Generation Company (the licensee) submitted a proposed amendment to the operating license for Peach Bottom Atomic Power Station (PBAPS), Units 2 and 3. The proposed amendment would permanently disable the existing automatic actuated carbon dioxide (CO<sub>2</sub>) fire extinguishing systems installed in the cable spreading room (CSR) and four emergency diesel generator (EDG) rooms. The licensee requests that the CO<sub>2</sub> fire extinguishing systems could operate only with manual actuation. Further the licensee proposed hand held fire extinguishers as the primary fire suppression method in the CSR and EDG rooms and proposed manually actuated CO<sub>2</sub> fire extinguishing system as a backup system.

The Nuclear Regulatory Commission (NRC) staff has reviewed the information the licensee provided that supports the proposed changes to their approved fire protection program. In order for the staff to complete its evaluation, the following additional information is requested:

- (1) Title 10 of the Code of Federal Regulations (10 CFR) 50.48(a) requires that each operating nuclear power plant have a fire protection plan which satisfies Criterion (GDC) 3 of Appendix A to Part 50. Criterion 3 of Appendix A to 10 CFR Part 50 requires that structures, systems, and components (SSCs) important to safety be designed and located to minimize the probability and effect of fires and explosions. It further requires that fire fighting systems shall be designed to assure that their rupture or inadvertent operation does not significantly impair the capability of these SSCs.

The NRC has provided specific criteria, information, recommendations, and guidance acceptable to the staff that may be used to meet the requirements of 10 CFR 50.48 and GDC 3. This information is provided in NUREG 0800, Standard Review Plan (SRP), Section 9.5.1, "Fire Protection Program," Regulatory Guide (RG) 1.189, and Branch Technical Position (BTP).

Appendix A to Branch Technical Position Auxiliary and Power Conversion Systems Branch (APCSB) 9.5-1, specified that licensees that have installed a gaseous fire suppression system in the CSR as a primary fire suppression system install a backup water spray system and hose stations.

- Are the automatic CO<sub>2</sub> fire extinguishing systems installed in the CSR and EDG rooms in compliance with the Appendix A to BTP APCS 9.5-1?
- Does Exelon plan to install a fixed water spray to back up the proposed manual CO<sub>2</sub> fire extinguishing system?
- What is (are) the code(s) of record (COR) for the CO<sub>2</sub> fire extinguishing system? Describe any deviation from the COR.

Enclosure

What types of systems will be provided in the CSR and EDG rooms? See National Fire Protection Association (NFPA) 12, "Standard on Carbon Dioxide Extinguishing Systems," 2000 Edition, Section 1-8.1 for types of manual systems.

On page 11 you note that, "the manual CO<sub>2</sub> system will permit rapid manual action using hand held fire extinguishers by the fire brigade. The manual CO<sub>2</sub> system provides a back-up in the unlikely event of a significant fire in the CSR."

Discuss how PBAPS Units 2 and 3 meet the BTP APCSB 9.5-1 requirements.

- (2) Your letter dated September 26, 2003, states that, "this letter contains two (2) regulatory commitments. One involves upgrading existing one-hour rated fire barrier in the Cable Spreading Room to three-hour rated barriers. The purpose of the fire barrier upgrades is to eliminate the Appendix R, Section III.G.2.c requirement for automatic suppression in the fire area. The installation of three-hour rated fire barriers meets the requirements of Appendix R, Section III.G.2.a..."

- Please explain your basis to conclude that this fire area fall under Section III.G.2 of Appendix R to 10 CFR Part 50 rather than Section III.G.3.
- Describe how CSR being divided as two separated fire areas? i.e., III.G.2 and III.G.3.

- (3) BTP APCSB 9.5-1, Section IV.C.5(f) states that, "possibility and probability of CO<sub>2</sub> systems being out-of service due to personnel safety consideration. CO<sub>2</sub> systems are disarmed whenever people are present in an area so protected. Areas entered frequently (even though duration time for any visit is short) have often been found with CO<sub>2</sub> systems shut off."

If the automatic CO<sub>2</sub> fire extinguishing systems in CSR and EDG rooms was installed to meet the above guidelines (i.e., system disarmed whenever people are present in CO<sub>2</sub> protected areas to prevent inadvertent operation), describe why proposed change is requested to the PBAPS Units 2 and 3 approved fire protection program.

- (4) The principle combustibles in EDG rooms consists of a large amount of lubricating and fuel oil. Rapid detection and actuation of the CO<sub>2</sub> fire extinguishing system should arrest a fire in the early stages. Due to the delayed actuation, since EDG area is unmanned it is unlikely that a manually actuated CO<sub>2</sub> system will extinguish a fast growing oil fire in its early stage in the EDG rooms. Converting the CO<sub>2</sub> fire extinguishing system from automatic to manual actuation could potentially compromise a second element of the defense-in-depth (DID) in this fire area, resulting in reduction of the DID required by the regulation. Section II of Appendix R to 10 CFR Part 50, "General Requirements," states that the fire protection program shall extend the concept of defense-in-depth to fire protection in fire areas that are important to safety, with the following objectives:

- Prevent fires from starting.
- Rapidly detect, control, and extinguish those fires that do occur.
- Protect structures, systems, and components that are important to safety so that a fire that is not promptly extinguished by the fire suppression activities will not prevent the safe shutdown of the plant.

Provide a technical justification that a manually actuated CO<sub>2</sub> system installed in the EDG rooms will rapidly control and extinguish a flammable liquid (lube oil) fast growing fire.

- Are EDG rooms have dike (curb) to retain lube oil spill? If yes, provide the dimension of dike (curb).
  - Describe how the fire brigade plans to fight a lube oil fire in EDG rooms.
  - Does the fire brigade have a readily available supply of specialized fire fighting equipment and training to effectively deal with large hydrocarbon fires inside a structure?
  - Describe critical components that have been identified in the manual actuation mode that their failure could lead to either no CO<sub>2</sub> delivered to the CSR and EDG rooms or to a reduced CO<sub>2</sub> concentration that would prevent successful fire extinguishment.
- (5) Upon receipt of a fire alarm in the main control room (MCR), what actions are taken to verify that a fire exists in the CSR or EDG rooms?
- Are these actions procedurized? How much time will be required to verify the alarm, locate the requisite response procedure, and manually initiate the CO<sub>2</sub> fire extinguishing system?
  - Upon verification that a fire exists in the CSR or in EDG rooms, do procedures direct the operators to manually initiate the CO<sub>2</sub> fire extinguishing system? Provide copies of the actual procedures directing the manual initiation of the CO<sub>2</sub> fire extinguishing system in CSR and EDG rooms.
  - For a fire in the CSR, what measures have you taken to assure that sufficient number of personnel are available to suppress the fire while shutting down the reactor?
  - Provide a copy of the fire brigade pre-fire plan for the CSR and EDG rooms for manual fire fighting.
  - Describe operator and fire brigade response to a fire alarm in the CSR and EDG rooms. Describe operator response upon receipt of a fire alarm signal; how manual fire fighting response is planned considering the distance from the main power block; and how manual fire fighting protective gear (bunker gear, SCBA, extra air supply, etc.) is ensured at the scene.

- What is the fire brigade response time (time when the fire brigade is fully assembled at the CSR and EDG rooms)? Has the security interface been considered?
- (6) Your letter dated September 26, 2003, states that, "The CSR contains two runs of one-hour fire rated Thermo-Lag raceway encapsulation barriers. One section is located on the Unit 2 side and other is on the Unit 3 side (refer Figure 2). Three-hour rated fire barriers will be installed in conjunction with changing the CO<sub>2</sub> system to a manually actuated system."
- Clarify exactly which raceway and their locations will be protected with three-hour rated electrical raceway fire barrier systems (ERFBS). Provide description of the function (e.g., reactor control, heat removal, makeup, monitoring etc.) of the ERFBS protected cabling.
- (7) Your submittal states that, "In June 2002, the E-2 EDG CO<sub>2</sub> system inadvertently discharged CO<sub>2</sub> into the E-2 EDG room while the EDG was running and two personnel were in the room."
- Have you performed a root cause investigation to determine the probable causes of inadvertent discharge of CO<sub>2</sub> into the E-2 EDG room?
  - Since the purpose of your modification is to minimize or eliminate risk to personnel, explain how the manual trip logic prevent inadvertent discharge of CO<sub>2</sub> in EDG rooms and CSR.
- (8) In your submittal you note that, "The second method of compliance is by protection of several raceways located in the CSR. The cables in the raceway need to be operable in the event of a fire in the CSR. Currently, these raceways are provided with a one-hour rated fire barrier encapsulation to meet Appendix R, Section III.G.2.c (one-hour fire barrier with automatic fire suppression and fire detection). A three-hour rated fire barrier will be installed in conjunction with making the CO<sub>2</sub> system manually initiated. A three-hour rated fire barrier will comply with Appendix R, Section III.G.2.a, which does not require automatic suppression capability."

This may be true if the remaining, exposed cables are only for a single train. The remaining, exposed cables are for both trains; the CSR is a III G.3 area; and "fixed suppression" is required and supercedes the no suppression of III G.2.a.

- Describe how CSR being divided as two separated fire areas.

In your submittal you note that, "A fire in the CSR that is capable of ignition and sustaining a fire in the fire resistive cable insulation is difficult to postulate." You did not provide information to substantiate this statement.

- Provide cable construction information (i.e., insulation and jacket material, such as XLPE/PVC) for all cables installed in cable trays or exposed (such as air drops) including vendor and/or manufacturer.

- (9) Describe the physical location of the remote or alternate shutdown panel(s) with regard to the CO<sub>2</sub> areas (above, below, next room, etc.). Are remote shutdown rooms adjacent such that also be effected by the CO<sub>2</sub> discharge? During acceptance tests were CO<sub>2</sub> levels measured in the alternate shutdown panel rooms and control room? If yes, what were the levels?
- (10) Do CSR CO<sub>2</sub> fire extinguishing systems maintain a primary and secondary CO<sub>2</sub> supply? In case of CO<sub>2</sub> system failure, provide the type of available fire suppression in CSR other than hand held extinguishers. Assuming system failure (i.e., stuck selector or discharge valve) what is maximum quantity of CO<sub>2</sub> that may be discharged into the CSR and EDG rooms?
- (11) Has the CO<sub>2</sub> fire extinguishing system installed in the CSR ever inadvertently discharged? If so, describe any CO<sub>2</sub> migration to the MCR, 4kV switchgear rooms, and areas of alternate shutdown panels or access or egress paths to areas of alternate shutdown panels.
- (12) Are CSR normally occupied areas? Describe any egress problems associated with CSR.
- (13) Provide the most recent full discharge test results of CO<sub>2</sub> fire extinguishing system installed in CSR and EDG rooms (include concentration, soak time, number of sensors, location of sensors, and any NFPA 12 COR information). Provide copies of actual discharge test results along with the COR verification test.
- (14) For smoke and heat ventilation the SRP Section 9.5.1 specifies that to facilitate manual fire fighting separate smoke and heat vents should be provided in specific areas such as CSR and other areas where the potential exists for heavy smoke conditions. Does PBAPS Units 2 and 3 CSR and EDG rooms have any engineered smoke management and/or products of combustion removal systems installed? If so, provide details of operation, exhaust paths etc.
- (15) Has the delay in actuation of a manual only CO<sub>2</sub> fire extinguishing system in the CSR been evaluated with respect to deep-seated cable fires? i.e., has Exelon evaluated the extra delay in CO<sub>2</sub> fire extinguishing system discharge?
- (16) Each EDG room has 16 heat detectors that currently initiate the automatic CO<sub>2</sub> fire extinguishing system. Does heat detector spacing meet NFPA 72, "National Fire Alarm Code®," COR and listings? Provide justification for assurance that the heat detection system will detect incipient fires in time for an operator to respond and manually initiate the CO<sub>2</sub> fire extinguishing system.
- (17) The CSR has 25 smoke detectors and are arranged in two zones to provide a cross-zoned configuration that is currently used for automatically actuating the CO<sub>2</sub> fire extinguishing system. The combination of the existing cross-zoned smoke detection system with the manual actuation of CO<sub>2</sub> fire extinguishing system has been proposed. Does smoke detector spacing meet NFPA 72, "National Fire Alarm Code®," COR? If



not, provide justification that the combination of an inadequate fire detection system and no automatic fire suppression will detect and extinguish a postulated fire before it could fully develop.

- (18) The in-situ combustible loading in the CSR consists of a large amount of electrical cable insulation, which may develop into a deep-seated fire if the actuation of CO<sub>2</sub> system is delayed. Manual fire fighting involving large amounts of cables is a considerable challenging even to the most well trained and equipped fire brigade.

Describe how the facility fire brigade personnel are instructed about the potential for a deep-seated fire, hazards associated with cable re-ignition, and methods to manually extinguish a deep-seated electrical cable fire.

- (19) Describe any common plenums (ventilation combustion air inlets) that may be common to any EDG rooms and describe how they maintain adequate three hour fire barriers.
- (20) Figure 2 of your amendment request, CSR layout sketch, shows CO<sub>2</sub> EMPC's and Disarm Switches inside the CSR. Describe what impact a CSR fire may have on maintaining the proposed manual actuation capability. This figure also shows air-conditioning units. Describe how these have been evaluated as an ignition and combustible source. Provide the type and quantity of oil (if applicable) contained in the each of air-conditioning units in the CSR.
- (21) For a full area fire in CSR, will manual operations be required to prevent maloperation of systems required to achieve and maintain safe shutdown? Assume all three-hour fire barriers do not fail.
- (22) The staff would like to under stand how you considered realistic fires that can occur in the EDG rooms, when you revised your fire protection strategy from "automatic" to "manual". In that context please provide the following information:

- Have any fires occurred in the PBAPS, units 2 and 3 EDG rooms? Provide details.
- With a manual actuated only CO<sub>2</sub> fire extinguishing system, it becomes more likely that fire could grow causing water to be needed to suppress. Are fire water drains installed in the EDG rooms? Are drains sized to accept significant water from fire fighting hose streams?
- Provide a comparative analysis (i.e., automatic and manual verses manual only) of the reliability of CO<sub>2</sub> fire extinguishing systems installed in the EDG rooms.

The staff would like to understand how you considered realistic fires that can occur in the CSR, when you revised your fire protection strategy from "automatic" to "manual". In that context please provide the following information:

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Peach Bottom Atomic Power Station, Units 2 and 3

cc:

Vice President, General Counsel and  
Secretary  
Exelon Generation Company, LLC  
300 Exelon Way  
Kennett Square, PA 19348

Site Vice President  
Peach Bottom Atomic Power Station  
Exelon Generation Company, LLC  
1848 Lay Road  
Delta, PA 17314

Plant Manager  
Peach Bottom Atomic Power Station  
Exelon Generation Company, LLC  
1848 Lay Road  
Delta, PA 17314

Regulatory Assurance Manager  
Peach Bottom Atomic Power Station  
Exelon Generation Company, LLC  
1848 Lay Road  
Delta, PA 17314

Resident Inspector  
U.S. Nuclear Regulatory Commission  
Peach Bottom Atomic Power Station  
P.O. Box 399  
Delta, PA 17314

Regional Administrator, Region I  
U.S. Nuclear Regulatory Commission  
475 Allendale Road  
King of Prussia, PA 19406

Mr. Roland Fletcher  
Department of Environment  
Radiological Health Program  
2400 Broening Highway  
Baltimore, MD 21224

Correspondence Control Desk  
Exelon Generation Company, LLC  
200 Exelon Way, KSA 1-N-1  
Kennett Square, PA 19348

Rich Janati, Chief  
Division of Nuclear Safety  
Bureau of Radiation Protection  
Department of Environmental Protection  
Rachel Carson State Office Building  
P.O. Box 8469  
Harrisburg, PA 17105-8469

Board of Supervisors  
Peach Bottom Township  
545 Broad Street Ext.  
Delta, PA 17314-9203

Mr. Richard McLean  
Power Plant and Environmental  
Review Division  
Department of Natural Resources  
B-3, Tawes State Office Building  
Annapolis, MD 21401

Dr. Judith Johnsrud  
National Energy Committee  
Sierra Club  
433 Orlando Avenue  
State College, PA 16803

Manager-Financial Control & Co-Owner  
Affairs  
Public Service Electric and Gas Company  
P.O. Box 236  
Hancocks Bridge, NJ 08038-0236

Manager Licensing-Limerick and Peach  
Bottom  
Exelon Generation Company, LLC  
Nuclear Group Headquarters  
Correspondence Control  
P.O. Box 160  
Kennett Square, PA 19348

Peach Bottom Atomic Power Station, Units 2 and 3

cc:

Director - Licensing  
Mid-Atlantic Regional Operating Group  
Exelon Generation Company, LLC  
Nuclear Group Headquarters  
Correspondence Control  
P.O. Box 160  
Kennett Square, PA 19348

Vice President-Licensing and Regulatory Affairs  
Exelon Generation Company, LLC  
4300 Winfield Road  
Warrenville, IL 60555

Senior Vice President  
Mid-Atlantic Regional Operating Group  
Exelon Generation Company, LLC  
200 Exelon Way, KSA 3-N  
Kennett Square, PA 19348

Senior Vice President, Nuclear Services  
Exelon Generation Company, LLC  
4300 Winfield Road  
Warrenville, IL 60555

Vice President, Mid-Atlantic Operations Support  
Exelon Generation Company, LLC  
200 Exelon Way, KSA 3-N  
Kennett Square, PA 19348

Manager License Renewal  
Exelon Generation Company, LLC  
200 Exelon Way  
Kennett Square, PA 19348